AGRICULTURAL NEWS LETTER

VOL. 11 - NO. 3 MAY-JUNE, 1943

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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CONTENTS

Agricultural News Letter (Du Pont)
Vol. 11, No. 3 May-June, 1943

INDUSTRIAL RESEARCH ACCELERATED BY WAR NEEDS

Urgent war needs have greatly accelerated the usual procedures of peacetime industrial research, according to Theodore G. Joslin, Director, Du Pont Public Relations Department.

Speaking before the Midcontinent Research Conference in Minneapolis recently, Mr. Joslin said it has been Du Pont's experience that eight years is an average interval between the first conception of an invention and its commercial use.

"However, under the urgency of wartime requirements, laboratories were scoured for new things," he said. "Every new material and product, every new method and idea that had any promise at all became subjects of earnest attention. Problems of cost, risk and capital, which must be of primary consideration in peacetime, were brushed aside by the much more pressing need to win the war."

Mr. Joslin said never before have we had at hand so many new industries in embryo, or so many young industries yet in the first flush of growth. Suddenly, without the usual preliminaries of maturity, many of these have become indispensable. He added that this country now has the manufacturing plants in which the investment, private and public, mounts into billions of dollars.

"Under forced pressures, such as only the combined might of 130,000,000 people could bring to bear, they have taken form in the space of months," he said. "We will continue to invent and thus to multiply our possessions. We will have at our command fifty, a hundred, times what we had before, chiefly of new materials. Means will be at hand to perform feats that men have long dreamed of doing."

Agricultural Possibilities Far-Reaching

Modern agriculture in the United States, Mr. Joslin said, dates from the War Between the States. Introduction of labor-saving machinery and science on the progressive farm preceded the mechanization of many industries.

"Indeed, it made possible the industrial revolution that was to be climaxed by the deluge of change which followed the First World War," he said.

In discussing some of the pending agricultural changes, Mr. Joslin pointed out that in the light of what already has been accomplished, the possibilities in the not distant future are most far-reaching.

NOTE: A printed copy of Mr. Joslin's complete address, entitled "The Post-War World," in booklet form, will be sent on request to the Editor of the "Agricultural News Letter."

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Vol. 11, No. 3 May-June, 1943

TROUGH METHOD ELIMINATES NEED FOR TIRE TUBES TO TREAT FENCE POSTS

American farmers, who replace a half billion fence posts annually, need not be concerned because those who treat freshly cut posts with chromated zinc chloride against early decay and termite attacks may no longer have available old tire tubes as part of their equipment.

A newer method of preserving posts which eliminates the need for using the unavailable rubber tire tubes has been developed. It is known as the trough method, which impregnates the green wood with the chemical by a simple soaking process.

Posts Treated With Chromated Zinc Chloride Often Last 10 to 15 Years

Treated posts will last 10 to 15 years while untreated posts often must be replaced every two or three years.

In the original tire-tube method, which was popular before the government took over all surplus tires, the posts were simply racked on end, a section of tube placed over the butt, and the preservative chemical in solution poured into the tube. The moisture and sap in the wood were replaced with the chromated zinc chloride solution which seeped through the entire length of the post.

The newer trough method, which can be used despite the tire-tube shortage, was developed at Clemson College, S. C. It requires only a wooden trough or half of a barrel. The top ends of ten or twelve newly cut and thoroughly green posts are immersed in the solution for three hours. A one-inch disk is sawed off of each post to remove any resinous material from the lower end which is then placed in the solution for 24 to 48 hours, or until the solution is absorbed. The posts are then removed and stacked on their top ends for two to four weeks, until thoroughly seasoned.

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AN OIL PAINT THAT THINS WITH WATER

Oil and water do mix! A new oil paint -- that thins with water -- designed especially for use over wallpaper is now available. By adding an emulsifying agent to an oil paint, Du Pont chemists have performed the feat of creating an oil-resin paste, one gallon of which, when thinned, makes about a gallon and a half. Called "Speed-Easy" Wall Finish, this new paint has all the advantages of flat oil finishes. It dries within an hour, but should not be washed for the first 16 to 30 days after applying. It is advisable to use two coats on new plaster, but on unglazed tile, brick, masonry, cinder-block, wallboard, and wallpaper, one coat is usually enough.

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Vol. 11, No. 3 May-June, 1943

WHITE COVERS HELP REDUCE TEMPERATURE OF BEEHIVES IN SUMMER

Painting beehive covers with at least two coats of good-quality white paint aids greatly in reducing the temperature within the hives on hot summer days.

This simple operation lowered average temperatures as much as 5.6, 6.8, and 8.8 degrees Fahrenheit on different days in carefully controlled Canadian tests with hives located in the sun. Bees, on very hot days, often cluster at the entrance to the hives, frantically fanning the air with their wings to set up air currents to lower the temperature within the hives.

Tests were conducted by the Department of Entomology, The University of Manitoba, Winnipeg, during three different summers to determine the effect of different colored hive covers on temperature within the hives.

Made of Wood Covered with Sheet Metal and Insulated with Pine Shavings

The covers were made of wood, covered with galvanized sheet metal, and insulated with about three-fourths of an inch of white-pine shavings. Empty hive bodies, placed on bottom boards which in turn were placed on ordinary wooden hive stands, all were painted white. The covers were either unpainted or painted differently.

A. V. Mitchener, reporting the results, gives detailed readings on several different days. For example, on a July 12, the hottest day recorded during the trials, 17 readings were taken at approximately 15-minute intervals, beginning around 9 a.m. The average hive temperatures follow: gloss white, 107 degrees; flat white, 108.1; aluminum, 109.4; canary yellow, 110.9; gloss black, 113.9; and unpainted galvanized cover, 113.8, the latter being 6.8 degrees hotter than the hive with the gloss white cover.

The hottest temperature reading within the hive during that sweltering July day was 108.5 degrees for the gloss white covered hive, and 115.7 for both the unpainted galvanized and the gloss black covered hives. A thermometer laid on top of each hive cover, all of which had been heated by the blazing sun for several hours, showed 122 degrees for flat white, up to 140 degrees for unpainted galvanized and 141.8 for black gloss paint.

On a day in late August the readings inside the hives were somewhat lower than the July 12 temperatures, varying from an average of 94.7 for gloss white to 103.5 for unpainted galvanized covers -- but the difference in temperatures was 8.8 degrees, even greater than for the hottest day of the summer.

Professor Mitchener says that unpainted covers with galvanized tops absorb practically as much heat as do those painted black.

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DIPHENYLAMINE AS A POSSIBLE STABILIZER FOR CAROTENE IN FEEDS

A possible new use for diphenylamine as a stabilizer for carotene, a precursor of vitamin A in animal and poultry feeds, may grow out of experiments being conducted by the government, if further tests determine that this chemical compound is harmless when fed to animals.

Diphenylamine, a coal-tar derivative, is used as a stabilizer in smokeless powder and soap, and as an ingredient in the government's new Formula No. 62 for control of screwworms which attack livestock, but it is not used in food or feeds.

Carotene, extracted from green and yellow plant materials, is being used to replace fish-liver oils in some feed preparations. However, carotene is readily oxidized, thereby losing its provitamin A value, according to Williams, Bickoff, and Van Sandt, the government scientists who conducted the work at the Western Regional Laboratory, Albany, California. The prevention of this oxidation is an important problem in the use of carotene as a vitamin A supplement for feeds.

Reporting their findings in "Science," Vol. 97, No. 2508, Jan. 22, 1943, these workers state that in a preliminary investigation to determine the stabilizing effect of about 100 substances of antioxidant character on carotene, diphenylamine was found to have the greatest stabilizing effect. More extensive tests are being made on these substances.

In the studies reported, two samples containing diphenylamine retained 96 and 97 per cent of the original carotene after 30 days of storage, whereas similar samples without diphenylamine retained only 58 and 68 per cent, respectively, of their original carotene content.

Physiological Effects of Diphenylamine Being Studied Further

The report adds that although the physiological effects of diphenylamine are not well known, rabbits usually recover from single doses of 0.5 to 1.5 grams per kilogram of body weight. Doses of 3 to 10 grams given to dogs as an anthelmintic produced no symptoms of intoxication which could be attributed to the effect of the treatment. This is over 1,000 times the amount needed to stabilize the animal's daily need for carotene.

Biological tests are being conducted at the California laboratory to determine whether small daily doses of diphenylamine have any deleterious effects on the animal and also to determine whether this compound interferes with the animal's ability to utilize carotene. Until these facts are determined, the scientists caution that it is not safe to attempt any practical application of the results of their preliminary study.

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UREA, USED FOR WOOD SEASONING, ALSO FOUND TO RETARD DECAY

Decay, incessant enemy of wood, is retarded by the chemical urea used to reduce checks, cracks, and similar defects which may occur during the drying of green lumber, according to laboratory investigations reported by F. H. Kaufert and E. A. Behr of the University of Minnesota in "Industrial Engineering and Chemistry," Vol. 34, p.1510, December, 1942.*

Tests with southern pine sapwood and Douglas fir, red oak, and cypress heartwood showed that urea applied in the quantities approaching those used in the drying process prevented the growth of wood-rotting fungi.

Concentrations of urea greater than 0.3 per cent, based on the oven-dry weight of wood, reduced the rate of decay; concentrations greater than 1 per cent prevented all growth of the wood-rotting fungi on the wood's surface.

Amount of Urea To Use Varies With Type and Dimensions of Wood

For chemical seasoning approximately 40 to 100 pounds of urea per thousand board feet is recommended, depending on the type and dimensions of the wood. The chemical's effectiveness is based on the maintenance of a considerable concentration between the surface and the interior. Concentrations in the outer one-eighth inch of the treated wood may be 10 per cent or higher, based on the dry weight of the wood, while at a half inch from the surface they may be less than 0.3 per cent. Definite preserving action would be exerted, the investigators feel, if these concentrations could be maintained under conditions conducive to decay.

Heating urea-treated wood causes some loss of urea. However, it appears to fix some of the chemical with the wood, either as urea or a reaction product, so that it is difficult to remove by leaching.

Urea has greatly facilitated the rapid seasoning of many lumber items urgently needed for war work. Used in air or kiln drying, it has made possible the seasoning of certain woods with minimum losses due to checks, cracks and other drying defects.

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*A reprint will be sent upon request to the Editor, Du Pont "Agricultural News Letter."

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"OUR FARM PRODUCTION LINE MUST BE MADE SAFE" -- H. L. MINER

Food is a strong weapon in our hands -- perhaps the most powerful weapon in this war.

Without food, the other weapons of war -- tanks, planes and guns -- could not fight.

It is food that makes our soldiers, sailors and marines the best in the world. It is food that is giving our Allies the strength to fight on.

It is the hope of food to come that helps the conquered peoples fight their Axis oppressors behind the lines.

So says H. L. Miner, Manager, Safety and Fire Protection Division of the Du Pont Company, in a statement prepared for the first issue of "Farm Safety Review," published by the National Safety Council. Mr. Miner, who is chairman of the Council's Farm Safety Committee, emphasizes the fact that "only by making our farm production line safe, only by driving home the fundamentals of safety on the farm, can we produce the food which we must have to win the war."

"Today, after more than a year of war, food's importance in the march to victory is becoming increasingly clear," he states. "The importance of food as a war weapon increases the responsibility of all who are working in the farm production line.

"It is up to us to see that our manpower, our tools of production, our natural resources in the soil are kept producing at the peak of their ability. The farm safety program is primarily concerned with keeping farm manpower on the job -- and indirectly, through the prevention of accidents, with keeping machines on the job. Our objectives are clear. The urgency of our task can be measured only by our desire for victory over the Axis."

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METAL REPLACEMENT CONTAINER ADOPTED FOR CARROT JUICE

New carrot juice cocktails are now being wrapped in cellophane -- another answer to the problem of metal shortages. The juice formerly was put up in tin cans. But, since the government needs all the tin and steel it can get for war purposes, carrot juice packers sought a substitute. They found that, through dehydration, they could pack enough cocktail powder (a special mix containing celery and salt as well as carrots) into a vest-pocket-size cellophane envelope to make a quart and a half of cocktail. Moistureproof and airtight, the new cellophane-laminated package not only saves metal but is much lighter than the cans of liquid juice, 24 bags of the cocktail powder replacing a shipping carton holding 96 twelve-ounce cans. The dehydrated powder weighs only 2¼ pounds, as against 103 pounds for the 96 cans of liquid.

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Agricultural News Letter (Du Pont)
Vol. 11, No. 3 May-June, 1943

SEED TREATMENT INCREASES COTTON YIELDS 19% IN OKLAHOMA EXPERIMENTS

Cottonseed treatments to prevent disease have shown average yield increases of 19 per cent in five years' tests in Oklahoma. As a result of this research, more than 75 per cent of the cotton seed planted in that state in 1942 was treated, compared with 5 per cent as recently as 1939.

"The probable profit to Oklahoma farmers in 1942 alone is conservatively estimated at more than $1,200,000," according to the 1942 Oklahoma Agricultural Experiment Station Biennial Report. "Because treated seed usually produce better stands, many growers plant from ¼ to 1/3 less treated seed, thus effecting a saving in cost of seed."

New Improved "Ceresan" seed disinfectant and 2% "Ceresan" are used to reduce seed decay and damping-off and to check certain other seed-borne diseases such as anthracnose or pink-boll and angular leaf-spot.

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SOYBEAN OIL FOR PAINT-MAKING SHOWS UP WELL IN DURABILITY TESTS

Applied to panels exposed over a long period of time to all sorts of weather, paint formulated with soybean oil is showing up "very favorably," according to a statement issued by the U. S. Department of Agricultural Chemistry and Engineering.

Raw soybean oil was tested as the only oil vehicle for exterior paints, and compared with a mixture of soybean and perilla oils and straight raw linseed oil paints.

Paints made with soybean oil as the only oil constituent gave very satisfactory durability results, even though tested under an air-drying schedule of 24 hours between coats and 48 hours air drying before exposure.

"The paints in which the only oil was soybean oil or a blend of soybean and perilla oils -- when correctly formulated with proper pigments and driers -- are equal in durability to similarly formulated linseed oil paints. The short drying period made the test severe for the soybean oil paint," the Bureau's report states.

The Bureau's laboratory made up 36 exterior white paints with varying percentages of oils and pigments.

The painted panels used to try out durability were exposed to the weather for four years.

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Vol. 11, No. 3 May-June, 1943

CHEMICALS PROTECT WOOD AGAINST DESTRUCTIVE FORCES OF NATURE

Chemical science is mobilized to defend all things made of wood against the destructive forces of decay, fire, termites, and the numerous other natural enemies that attack them all the way from the growing tree to the finished product, L. F. Livingston, Manager, Agricultural Extension Division, the Du Pont Company, told the Allegheny Section of American Foresters in Philadelphia recently.

"Chemists, plant pathologists, entomologists and engineers have devoted years of painstaking research to develop this defense, and they are still at work," Mr. Livingston said.

"As a result, it is now possible to enhance the appearance, usefulness, and value of wood that comes from growing trees, by proper treatments with suitable chemicals, within the limits of their availability."

Hundreds of Millions of Cubic Feet of Lumber Treated Annually

Mr. Livingston told the group that hundreds of millions of cubic feet of lumber are now treated with chemicals for control of wood-rotting fungi, termites, and marine borers; for seasoning and preserving of wood; for flame-proofing, bending, bleaching, plasticizing; and generally for making wood and its products more durable and valuable.

The speaker, who is also a Director of the American Forestry Association, said that while forest fertilization is in its infancy, experimental evidence shows that use of commercial plant food for trees often pays. Numerous insecticides, fungicides, and other chemical treatments also have been found of great economic importance.

Mr. Livingston cited the recent discovery of a new penetrating spray made of orthodichlorobenzene and ordinary Diesel oil that kills bark beetles on thin-barked pines. This eliminates the hazardous and expensive method of destroying the immature broods by fire. He likewise revealed that the gum flow of slash and longleaf pine trees is greatly increased by applications to the newly cut faces of solutions of sulfuric acid or of caustic soda.

Various Chemical Treatments Enhance Value of Lumber

In discussing various chemical treatments of lumber, he said that phenyl mercury oleate is being used as a surface protectant against infection by wood-rotting organisms on fabricated wood parts such as cargo bodies of automobile trucks, wood gliders, and wooden boats.

Mr. Livingston told of the use of chromated zinc chloride to prevent premature decay and termite attack and fire. He said treated wood often outlasts the untreated from three to ten times. Use of the chemical for protecting freshly cut green fence posts is growing rapidly, he said, pointing out that American farmers replace a half billion fence posts annually.

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He dwelt on the use of crystal urea to eliminate seasoning degrades in sawed lumber, such as splitting, checking, honeycombing or "hollow horning," warping, and internal collapse. He said urea was also used for seasoning poles, pilings, and posts; staves and headings for cooperage; hickory handles; bobbin-and-shuttle stock, and other similar items.

"Green woods, sufficiently impregnated with urea by soaking in a concentrated solution and then air- or kiln-dried, become relatively plastic when heated", he said. "They can be bent, twisted, and compressed; and retain their new shapes, resuming their normal rigidity and hardness when cool. On reheating, the wood again becomes plastic."

Mr. Livingston said that commercially treated handles on picks, shovels, pitchforks, and other tools have that blonde look because they are bleached with hydrogen peroxide. Numerous other wood products are bleached either by spraying the chemical on the veneer to produce a surface bleach or by immersing the veneer to give a bleach that will permit deeper sanding operations.

The use of ethyl mercury phosphate to control blue-stain, particularly in areas where conditions for growth of the fungus that causes blue-stain are severe, was described.

Products of Forest Utilized By Chemical Industry

The speaker also discussed uses of the products of the forest by the chemical industry. Wood pulp, he said, is an important source of cellulose from which a vast array of products is derived, including smokeless powder, essential to every arm of the service. Wood flour enters into the manufacture of commercial explosives, now of untold value in military projects and in the mining of strategic metals needed for war.

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STUDIES SHOW "DELSTEROL" PREVENTS RICKETS AND CROOKED BREAST BONE

"D"-activated animal sterol in poultry feed prevents rickets and crooked breast bones in chicks, studies at the University of Arkansas Agricultural Experiment Station show.

The Arkansas experiments verify the fact that this product, manufactured by Du Pont and trade-marked "Delsterol," "is a reliable source of vitamin D in bringing about normal calcification of bone in chicks," according to S. R. Johnson, assistant animal husbandman at the Arkansas College of Agriculture.

He points out that lack of vitamin D not only causes rickets, a disease characterized by the development of crooked long bones due to the failure of the bones to calcify, but that "recent studies at the University of Arkansas College of Agriculture indicate that one of the major causes of crooked breast bones in poultry is a lack of vitamin D."

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Vol. 11, No. 3 May-June, 1943

ANY ONE OF 7 METHODS OF DOSING SHEEP WITH PHENOTHIAZINE KILLS STOMACH WORM

The efficiency of phenothiazine for control of the common stomach worm in sheep ran from 99.7 to 100 per cent, regardless of which of seven different methods of dosing was used, in tests made by the Oklahoma Agricultural Experiment Station.

Hilton M. Briggs and H. C. Smith, who conducted the experiments, state that this troublesome internal parasite is the most devastating pest found in farm flocks wherever sheep are kept under confined conditions.

Phenothiazine Effective Against Most Internal Parasites Except Tapeworms

The Oklahoma scientists add that phenothiazine is effective against most other internal parasites of sheep, except tapeworms, including nodular worms which not only reduce production but reduce the supply of sound sheep intestines, the principal source of certain types of surgical sutures.

In discussing their experiments with stomach worms, they say that phenothiazine has been administered in about every way it is possible to get medication into the digestive tract of sheep.

"Any method which is roughest on the blood-sucking stomach worm should be most effective in controlling the nodular worm, as the latter is farther down the intestinal tract than its stomach cousin," they add.

For all practical purposes, any one of the following seven methods was found as good as another for treating with phenothiazine.

1. A commercial suspension of phenothiazine given slowly from a syringe after the lambs have been given a taste (½ oz.) of one per cent copper sulfate (bluestone) solution. The copper sulfate closes the esophageal groove so the drug can go directly into the true stomach.

2. A commercial suspension of phenothiazine given slowly without previous treatment.

3. Phenothiazine powder mixed with an equal weight of blackstrap molasses, water added, and the suspension given from a syringe.

4. Phenothiazine powder mixed with an equal weight of blackstrap molasses and added to grain.

5. A commercial suspension of phenothiazine given by the "Texas" method. A syringe with a 6-inch nozzle is used for administering. The nozzle is placed far back in the throat of the sheep while the free hand shuts off the wind by grasping over the nose. The drug is given instantaneously with a quick thrust of the plunger.

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6. A commercial suspension of phenothiazine given by the "Texas" or "quick" method following a taste of copper sulfate solution.

7. Phenothiazine given in the form of a commercial pellet.

In some preliminary experimental work, phenothiazine was given lambs by four different methods, just prior to slaughter, and the stomach content examined to find where the drug had gone. Two lambs were each given 2 ounces of a commercial phenothiazine suspension slowly from a syringe after the lambs had received a taste ($\frac{1}{2}$ oz.) of one per cent copper sulfate solution. The copper sulfate apparently closed the esophagus groove, because all the material was found in the true fourth stomach (abomasum.) Two more lambs had the phenothiazine suspension administered in the same manner except that nothing was previously given the lambs. In these lambs approximately 90 per cent of the drug was found in the paunch (rumen) and the remainder in the second stomach.

Two lambs were treated by the "Texas" method commonly used on the ranges of that state. These lambs, of course, had no chance to swallow, and all the phenothiazine was recovered in the rumen. Two remaining lambs were given a taste of copper sulfate and then the phenothiazine by the "Texas" method. The results were about the same as when it had been given slowly (the lambs swallowing) without the swallow of copper sulfate.

To determine the effectiveness of phenothiazine that first goes into the paunch in killing stomach worms, the Oklahoma scientists obtained 36 head of heavily parasitized lambs from two local farms on October 30, 1942. The 18 of these lambs that came from one farm had been drenched once in mid-July with a solution of copper sulfate and steeped snuff. The remaining lambs came from a flock that had been drenched four times during the grazing season. The first two treatments were with a copper sulfate-"Black Leaf 40" drench. The last two treatments were with a commercial drench of tetrachlorethylene suspended in oil. The first of these commercial treatments had been given six weeks, and the last treatment two weeks, prior to the time the Oklahoma Station obtained the lambs.

Each of Nine Groups of Lambs Treated by Different Method

Microscopic examinations of the individual droppings showed all the lambs to have a heavy infestation of stomach worms, but few other internal parasites. Degree of infestation found in this inspection, origin of the lambs, and the weight of the lambs were used in dividing them into nine uniform groups of four lambs each. Each lot of lambs was treated by a different method on Nov. 5, and all fed together on oats, corn, and alfalfa hay after treatment. They were slaughtered at a packing plant on November 17. The stomachs of all lambs were returned to the Station, and the number of stomach worms in each true stomach carefully counted. The methods of treatment and the number of worms found in the stomachs of each lot are shown in Table 1. Obviously, the fewer the number of stomach worms found at slaughter, the more effective the treatment.

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TABLE 1 -- Effectiveness of Different Treatments in Removing Stomach Worms (Haemonchus Contortus) from Lambs

Lot No.	No. of Lambs	Treatment**	Initial Weight	Final Weight	Worms Recovered at Slaughter
1	3*	Phenothiazine slow after ½ oz. copper sulfate sol.	54.0	59.7	9
2	4	Phenothiazine slow	53.2	58.5	24
3	4	Phenothiazine in molasses, drench	56.0	59.7	0
4	4	Phenothiazine in feed	54.7	60.2	5
5	4	Phenothiazine -- fast or Texas method	56.2	61.5	17
6	4	Phenothiazine fast after ½ oz. copper sulfate sol.	56.2	57.7	1
7	4	Phenothiazine in commercial pellet	57.2	61.0	12
8	4	2½ oz. of 1 per cent copper sulfate solution	57.2	62.2	97***
9	4	CHECK -- NO TREATMENT	53.2	53.7	7792

*Four lambs were originally designated for this lot, but one lamb was left untreated and had 1,886 stomach worms at slaughter.
**All lambs receiving phenothiazine were given 13.5 grams.
***One fringed tape worm.

The lambs that were treated with the 1 per cent copper sulfate solution were kept off feed and water for 16 hours before and six after treatment. The phenothiazine administered in feed was added to a mixture of grain and rolled oats. A light sprinkling of dry rolled oats was placed on top of the mixture as bait. The lambs ate the bait readily, but stopped eating after nibbling some at the mixture. They were fed no other feed, and it was approximately 24 hours before they cleaned up the medicated feed.

All lambs except the untreated ones made substantial gains. There was, of course, considerable fill represented in these gains. It is doubtful if there is a worthwhile difference in the gains made by the treated lots, but they all did make a substantially greater gain than the untreated lambs.

The commercial mixture of tetrachlorethylene in oil given prior to the Oklahoma tests was apparently not effective, according to the Oklahoma scientists. The two untreated lambs from the flock that had used this mixture twice in the last six weeks showed a heavy infestation, and one of these lambs carried 2,315 stomach worms at slaughter. The flock from which these lambs came showed evidence of a heavy infestation, and microscopic examinations of feces samples showed as many worm eggs from these lambs as from other flocks that served as a source of experimental lambs.

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Agricultural News Letter (Du Pont)
Vol. 11, No. 3 May-June, 1943

SOIL TREATED WITH FORMALDEHYDE AFTER SEEDING TO CONTROL DAMPING-OFF

Formaldehyde has long been used as a soil disinfectant, but much is still being learned about better, more convenient, more economical ways for its use in controlling the damping-off of vegetables.

W. L. Doran, E. F. Guba, and C. J. Gilgut of the Massachusetts Agricultural Experiment Station find that formaldehyde in low concentrations can safely and effectively be applied to soil immediately after vegetable seeds are sowed. The method is simple and economical, for the soil usually needs to be watered at this time anyway, and there is, except for the adding of formaldehyde to water, no extra operation involved.

Dilutions and rates of application of formaldehyde applied to soil after seeding vary slightly for different vegetables. On the basis of their work and as suggested in Massachusetts Agricultural Experiment Station Bulletin No. 394, "The Control of Damping-off of Vegetables by Formaldehyde and other Chemicals," these are as follows:

Vegetables to be protected	USP (37%) Formaldehyde solution in 0.8 qt. water per sq. ft.	Gallons of water with which to dilute 1 fluid ounce (2 tablespoonfuls) of USP formaldehyde solution and numbers of sq. ft. of seedbed to be treated with same
Beet, spinach, Swiss chard, eggplant	2.50 cc.	2.5 gal., for 12 sq. ft.
Tomato, pepper, cucumber, muskmelon, squash, celery, onion	2.00 cc.	3.0 gal., for 15 sq. ft.
Lettuce, endive, chicory, dandelion	1.75 cc.	3.5 gal., for 17 sq. ft.

These figures are based more on amounts that are safe with certain vegetables than on amounts required for protection against infection by soil-infesting fungi, principally, in this work, species of Pythium. They are to be considered more as maximum rates of application than as minimum rates. As little as 1.2 cc. or even 0.6 cc. of USP (37%) formaldehyde solution per square foot has improved the stands; that is, increased the numbers of plants which lived; and these are very light applications compared with those commonly used in the past. But growers will do well, especially when treating heavily infested soil, to follow the suggestions made in the table. If a grower finds himself unable to obtain enough formaldehyde, lighter application, down to

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about 1.0 cc. per square foot, may be made with the expectation that, even if damping-off is not entirely eliminated, its severity will be materially reduced.

Commercial formaldehyde solution, properly diluted, may also be applied to soil immediately after seeding without determining the exact rate of application. Damping-off of a number of species was well and safely controlled by 1 teaspoonful (4.9 cc.) formaldehyde solution in 1 gallon of water (1 tablespoonful in 3 gallons) when soil was watered with it after seeding, without determining the exact quantity of the solution applied per square foot. This is likely to be 1.5 pints to 1.5 quarts of the solution, or about 0.9 to 1.8 cc. formaldehyde per sq. ft. But within such limits and with many of the commonly grown vegetables, the exact quantity of water applied per square foot may not be of great importance. Thus used, the rate of application not accurately determined, 1 teaspoonful (but not 0.5 teaspoonful) formaldehyde solution per gallon of water often improved the stands of seedlings as much as did greater concentrations. Up to 2 teaspoonfuls per gallon did not injure beets, cucumbers, peppers, and tomatoes, but, with the rate of application unknown, 1 teaspoonful formaldehyde per gallon is as much as is recommended.

Applied after seeding, there was good control of damping-off by formaldehyde in soils having pH values between 5.5 and 7.0, soil reaction within these limits being apparently an unimportant factor.

These methods are not recommended for use with crucifers (members of the cabbage or mustard family), for they are too susceptible to injury by it; but, for use with other commonly grown vegetables, these methods are safe providing a few simple precautions are taken. Seeds should not be soaked in water before planting; the formaldehyde solution should not be too cold, not below about 50°F., when applied to soil; and the treated soil should not be covered, as with burlap, since that would retard for too long the escape of the formaldehyde in gaseous form.

Growth of Seedlings Improved By Formaldehyde Treatment

Treatment of infested soils with formaldehyde improved the growth of seedlings of several kinds of vegetables. There was no such improvement in growth when it was applied to soils in which fungi had been killed by previous steaming, and it is considered probable that the effect of formaldehyde is due principally to its freeing the plants of the retarding effects of soil fungi.

It is sometimes desirable to water soils from below, to sub-irrigate as, for example, after sowing very small seeds in pots or flats. If the soil is sandy and fairly dry, formaldehyde may be effectively applied at the same time by setting the containers into shallow pans of the solution until the soil becomes saturated. There was no chemical injury to plants of the species used, and the severity of damping-off was greatly reduced by 2 teaspoonfuls of formaldehyde per gallon of water. But after treatment with formaldehyde, however applied, it was usually better to water soil from above rather than from below.

Continued on next page

The surface treatment of soil with very dilute formaldehyde solutions immediately after seeding proved to be a safe, simple, inexpensive and effective method of preventing both pre- and post-emergence damping-off. There is no delay between soil treatment and seeding. Relatively little formaldehyde is used per unit area. The method saves time, labor, chemical, and, no less to the point, seeds and plants.

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U.S.D.A. ADVOCATES USE OF HOSPITAL PASTURE TO TREAT AGAINST SCREWWORM

Establishment of a hospital pasture where animals with wounds can be treated with chemicals against screwworm infestation is advocated by government livestock specialists to help avoid the $5,000,000 annual loss attributed to this costly pest.

In such a pasture, the stockman can treat his isolated animals with Smear No. 62, made according to the government's new formula by combining 3½ pounds of diphenylamine, 3½ pounds of benzol, 1 pound of Turkey red oil, and 2 pounds of lampblack -- or amounts in similar proportions.

Smear 62 Kills Maggots and Protects Against Reinfestation

This material has the consistency of thin paint and is applied with a small paintbrush twice a week, until the wounds have healed. It kills the maggots, and protects against reinfestation for several days.

The screwworm fly attacks animals only through wounds and open sores, laying their eggs in the living flesh. There the ugly maggots hatch, feed, and destroy the animal tissue.

"War Against Costly Pest Will End Only With Total Extermination"

A recent issue of "Western Livestock Journal," commenting on the government's recommendations for control, says that "if Japanese or Nazi saboteurs destroyed five million dollars' worth of provisions each year in the United States, there would be a great hue and cry, and they would be hunted down and slain."

"But that domestic saboteur the screwworm, does it and has been getting away with it," the item adds "Our agricultural FBI has not been idle. Patiently it has woven a chemical web around him and is ready to spring the trap. If the formula (Smear No. 62) is followed in treating him, he will do no more harm."

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Agricultural News Letter (Du Pont)
Vol. 11, No. 3 May-June, 1943

PAINTING GALVANIZED POULTRY EQUIPMENT HELPS PREVENT RUST

Painting galvanized poultry equipment helps prevent destructive rust formation.

This conservation measure is particularly important because of the war-time need to prolong the serviceable life of equipment now in use on the farm.

Du Pont paint technicians suggest, as a preliminary step, the use of a suitable commercial wash especially designed to remove foreign material. Such a wash also etches the surface slightly, so that subsequent paint coats will adhere readily.

Surfaces that are subject to constant water contact should not be painted. For equipment used indoors, a first coat of "Duco" Undercoat, followed by War Emergency Brush "Duco" Enamel, is recommended.

For feed hoppers, the dry outside sections of water fountains, and other equipment exposed to the weather, a lead-free paint, such as "Chivo" house paint, is recommended. A paint that contains lead might prove harmful should the chickens peck it off in any quantity.

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TREATED COTTON SEED YIELDS 800 POUNDS PER ACRE -- UNTREATED 600 POUNDS

Actual experience has convinced another Southern grower that he can produce a third more cotton by treating the planting seed with an organic mercury compound.

Clifford Alston, Drew County agricultural agent, in a report to the Extension Service of the Arkansas College of Agriculture, states that one of his cooperators, J. H. Adcock, obtained a yield of 800 pounds of cotton per acre from seed treated with "Ceresan" seed disinfectant and only 600 pounds from untreated seed. Conditions otherwise were the same.

Last year, Mr. Adcock did not have sufficient treated seed to plant his entire acreage, so he used some that was untreated. The cotton grown from the treated seed came up with a good stand and was ready to cultivate within a few days. The untreated seed produced plants that turned yellow and made only a poor stand, with consequent lower yield.

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